

**Abstract**

Systems and methods for sensing air outside a moving aircraft are presented. In one embodiment, a system includes a laser for generating laser energy. The system also includes one or more transceivers for projecting the laser energy as laser  
5 radiation to the air. Subsequently, each transceiver receives laser energy as it is backscattered from the air. A computer processes signals from the transceivers to distinguish molecular scattered laser radiation from aerosol scattered laser radiation and determines one or more air parameters based on the scattered laser radiation. Such air parameters may include air speed, air pressure, air temperature and aircraft  
10 orientation angle, such as yaw, angle of attack and sideslip.